

Oblique Insonification Ultrasonic NDE of Composite Materials for Space Applications

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ABSTRACT

In recent years, a great deal of research has been exerted to developing NDE methods for the characterization of the material properties of composites as well as other space structural materials. The need for information about such parameters as the elastic properties, density and thickness are critical to the safe design and operation of such structural materials. Ultrasonics using immersion methods has played an important role in these efforts due to its capability, cost effectiveness and ease of use. The authors designed a series of ultrasonic oblique insonification experiments in order to develop a practical field applicable NDE method for space structures. This method is based on the use of a pitch-catch arrangement of obliquely activated transmitter and receiver. The method requires the measurement of various plate wave modes in composite laminates along different propagation directions. Efficient data acquisition techniques were developed to identify the modes which are related to material properties. Efforts are underway at JPL to make the technology user friendly to allow its implementation as a practical NDE tool as part of quality assurance procedures.